

App. No. 10/065,992
Amendment dated March 30, 2005
Reply to Office action of December 30, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the present application.

Listing of Claims:

Claim 1 (currently amended): A surface-coated machining tool, comprising:
a cemented-carbide base material containing tungsten carbide and cobalt,
with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less;
and

coated to a given thickness in at least a single layer over said cemented-carbide base material, a compound thin film made up of a combination of, in given elemental proportions, one or more elements selected from the group titanium, chromium, vanadium, silicon and aluminum, and one or more elements selected from carbon and nitrogen; wherein

~~said compound thin film is coated in at least a single layer~~
said compound thin film is vapor-deposited onto said base material under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions that, together with said given thickness and said given elemental proportions, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and 8 GPa or less to said compound thin film.

Claim 2 (currently amended): The surface-coated machining tool set forth in claim 1, wherein said predetermined thickness of said compound thin film is 0.05 μm or more and 3 μm or less in thickness.

Claim 3 (canceled)

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Claim 4 (original): The surface-coated machining tool set forth in claim 1, wherein said compound thin film is in surface roughness adjusted to be $0.01\text{ }\mu\text{m}$ or more and $0.5\text{ }\mu\text{m}$ or less by indication Ra.

Claim 5 (currently amended): A surface-coated machining tool, comprising:
a cemented-carbide base material containing tungsten carbide and cobalt, with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less; and

a hard carbon thin film made up essentially of carbon atoms only, coated to a given thickness over said cemented-carbide base material in at least a single layer, by a physical vapor deposition method in which graphite is made a raw material, and under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions that, together with said given thickness, are predetermined so as to impart a compressive residual stress of 0.1 GPa or more and 8 GPa or less to said compound thin film, wherein

~~said hard carbon thin film is coated in at least a single layer.~~

Claim 6 (original): The surface-coated machining tool set forth in claim 5, wherein said hard carbon thin film is $0.05\text{ }\mu\text{m}$ or more, and $3\text{ }\mu\text{m}$ or less in thickness.

Claim 7 (canceled)

Claim 8 (previously presented): The surface-coated machining tool set forth in claim 5, wherein said hard carbon thin film is in surface roughness adjusted to be $0.01\text{ }\mu\text{m}$ or more and $0.5\text{ }\mu\text{m}$ or less by indication Ra.

Claim 9 (original): The surface-coated machining tool set forth in claim 1, wherein the tungsten carbide in said cemented-carbide base material is $0.1\text{ }\mu\text{m}$ or more and $1.5\text{ }\mu\text{m}$ or less in pre-sintering crystal-grain size.

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Claim 10 (original): The surface-coated machining tool set forth in claim 2, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 11 (original): The surface-coated machining tool set forth in claim 3, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 12 (original): The surface-coated machining tool set forth in claim 4, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 13 (original): The surface-coated machining tool set forth in claim 5, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal grain size.

Claim 14 (original): The surface-coated machining tool set forth in claim 6, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 15 (original): The surface-coated machining tool set forth in claim 7, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

Claim 16 (original): The surface-coated machining tool set forth in claim 8, wherein the tungsten carbide in said cemented-carbide base material is 0.1 μm or more and 1.5 μm or less in pre-sintering crystal-grain size.

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Claim 17 (previously presented): A surface-coated machining tool,
comprising:

a cemented-carbide base material containing tungsten carbide and cobalt,
with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less;
and

coated to a given thickness in at least a single layer over said cemented-
carbide base material, by a ~~physical-vapor~~ cathodic-arc deposition method, a
compound thin film made up of a combination of in given elemental proportions, one
or more elements selected from the group titanium, chromium, vanadium, silicon and
aluminum, and one or more elements selected from carbon and nitrogen; wherein
~~said compound thin film is coated in at least a single layer; and~~
reaction-gas pressure, base-material bias voltage, and deposition-
temperature conditions in said cathodic-arc deposition method, together with
said given thickness and said given elemental proportions, are predetermined
so as to impart a compressive residual stress of 0.1 GPa or more and 8 GPa
or less ~~is imparted~~ to said compound thin film.

Claim 18 (previously presented): A surface-coated machining tool,
comprising:

a cemented-carbide base material containing tungsten carbide and cobalt,
with the cobalt inclusion amount being 4 weight % or more and 12 weight % or less;
and

coated in at least a single layer over said cemented carbide base material, by
a ~~physical-vapor~~ cathodic-arc deposition method, a compound thin film 0.05 μm or
more and 3 μm or less in thickness, made up of a combination of in given elemental
proportions, one or more elements selected from the group titanium, chromium,
vanadium, silicon and aluminum, and one or more elements selected from carbon
and nitrogen; wherein

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~~said compound thin film is coated in at least a single layer; and~~
reaction-gas pressure, base-material bias voltage, and deposition-
temperature conditions in said cathodic-arc deposition method, together with
said thickness and said given elemental proportions, are predetermined so as
to impart a compressive residual stress of 0.1 GPa or more and 8 GPa or less
~~is imparted to said compound thin film~~

Claim 19 (previously presented): A surface-coated machining tool,
comprising:

a cemented-carbide base material containing tungsten carbide 0.1 μm or
more and 1.5 μm or less in pre-sintering crystal-grain size, and cobalt, with the cobalt
inclusion amount being 4 weight % or more and 12 weight % or less; and

a hard carbon thin film made up essentially of carbon atoms only, coated to
0.05 μm or more, and 3 μm or less in thickness over said cemented-carbide base
material in at least a single layer, by a physical vapor deposition method in which
graphite is made a raw material, and under reaction-gas pressure, base-material
bias voltage, and deposition-temperature conditions that, together with said
thickness, are predetermined so as to impart a compressive residual stress of 0.1
GPa or more and 8 GPa or less to said compound thin film; wherein
~~said hard carbon thin film is coated in at least a single layer.~~

Claim 20 (previously presented): A surface-coated machining tool,
comprising:

a cemented-carbide base material containing tungsten carbide 0.1 μm or
more and 1.5 μm or less in pre-sintering crystal-grain size, and cobalt, with the cobalt
inclusion amount being 4 weight % or more and 12 weight % or less; and

a hard carbon thin film made up essentially of carbon atoms only, coated to a
given thickness over said cemented-carbide base material in at least a single layer,
by a physical vapor cathodic-arc deposition method in which graphite is made a raw

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material, and under reaction-gas pressure, base-material bias voltage, and deposition-temperature conditions that, together with said given thickness, are predetermined so as to impart; wherein

~~said hard carbon thin film is coated in at least a single layer; and~~
a compressive residual stress of 0.1 GPa or more and 8 GPa or less is imparted to said hard carbon thin film.